

**CLAIMS**

**I Claim:**

1           **1.**     A method of generating operation codes, comprising:  
2           creating a plurality of encoded code words;  
3           eliminating from the plurality of encoded code words all code words that do  
4           not meet a predetermined selection criteria;  
5           selecting an encoded code word from the plurality of remaining encoded code  
6           words;  
7           determining a hamming distance between the selected encoded code word  
8           and all remaining encoded code words;  
9           deleting all of the remaining encoded code words that do not have a  
10          hamming distance greater than a predetermined minimum with the selected encoded  
11          code word, to form a set of encoded code words, wherein the predetermined  
12          minimum hamming distance prevents any two encoded code words from having  
13          fewer than a predetermined number of bits different.

1           **2.**     The method recited in claim 1, wherein the predetermined selection  
2           criteria is that each encoded code word will have an equal number of ones and  
3           zeros.

3. The method recited in claim 2, wherein the operations of selecting an encoded code word from the plurality of remaining encoded code words, determining a hamming distance between the selected encoded code word and all remaining encoded code words, and deleting all of the remaining encoding code words that do not have a predetermined minimum hamming distance with the selected encoded code word to form a set of encoded code words are repeated for each and every encoded code word in the set of encoded code words to form a finite set of encoded code words representing operation codes.

4. The method recited in claim 3, further comprising:  
selecting an encoded code word from the finite set of encoded code words;  
and  
reverse mapping each encoded code word of the finite set of encoded code words to form a second set of finite encoded code words in which each encoded code word has been reduced in size by a predetermined number of bits.

5. The method recited in claim 4, further comprising:  
reverse scrambling the second set finite encoded code words to form a set of operation codes, wherein the set of operation codes represent functions to be performed by a receiving device.

6. A method for transmitting and receiving a packet of information, comprising:

generating a table having a plurality of associated operation codes, scrambler syndrome values, scrambled values, and encoded code words, wherein the plurality of encoded code words have been selected based upon predetermined criteria and each code word has a maximum hamming distance between all other encoded code words;

resetting a scrambler generator using a scrambler seed value at the beginning of transmission;

scrambling a plurality of data value by XORing the plurality of data values with a value from the scrambler syndrome generator to form a plurality of scrambled values;

encoding the plurality of scrambled values to a plurality of encoded scrambled values having a greater number of bits;

transmitting an encoded code word representing an operation code to a receiving device;

decoding and descrambling the encoded code word to create a code word;

comparing the code word against the table having the plurality of associated operation codes, scrambler syndrome values, scrambled values, and encoded code words by the receiving device; and

acting upon the received opcode immediately after decoding to properly process the rest of the incoming data.

7. The method recited in claim 6, wherein the predetermined selection criteria is that each encoded code word will have any equal number of ones and zeros.

8. The method recited in claim 7, wherein the minimum hamming distance between the encoded code words prevents each of the encoded code words from having fewer than a predetermined number of bits different from any other encoded code word.

9. The method recited in claim 8, wherein the accepting of the data when a match is found in the table containing all the encoded code word, further comprises:

receiving a character by the receiving device;  
decoding the received character to reduce the number of bits contained in the receive character;

de-scrambling the character by XORing the character with the value received from the scrambler generator;

determining if a first character received is a valid opcode by comparing the first to a table containing opcodes;

transmitting a retransmission when the first character is not a valid opcode and

repeating receiving a character by the receiving device, decoding the received character to reduce the number of bits contained in the receive character, de-

15 scrambling the character by XORing the character with the value received from the  
16 scrambler generator until no further characters are received when the first character  
17 is a valid opcode.

1           **10.** The method recited in claim 9, wherein the predetermined selection  
2 criteria is that each encoded code word will have any equal number of ones and  
3 zeros.

1           **11.** The method recited in claim 10, wherein the hamming distance  
2 between the plurality of encoded code words prevents any two encoded code words  
3 of the plurality of encoded code words having fewer than a predetermined number  
4 of bits different.

1           **12.** The method recited in claim 11, wherein the minimum hamming  
2 distance is four bits.

3           **13.** A computer program embodied on a computer readable medium and  
4 executable by a computer, comprising:

5           generating a table having a plurality of associated operation codes, scrambler  
6 syndrome values, scrambled values, and encoded code words, wherein the plurality  
7 of encoded code words have been selected based upon predetermined criteria and  
8 each code word has a minimum hamming distance between all other encoded code  
9 words;

10 resetting a scrambler generator using a seed value;  
11 scrambling a plurality of data values by XORing the plurality of data values  
12 with the plurality of data values generated by the scrambler generator to form a  
13 plurality of scrambled values;  
14 converting the plurality of scrambled values to a plurality of encoded  
15 scrambled values having a greater number of bits;  
16 transmitting an encoded code word representing an operation code to a  
17 receiving device;  
18 decoding and descrambling the encoded code word to create a code word;  
19 comparing the code word against the table having the plurality of associated  
20 operation codes, scrambler syndrome values, scrambled values, and encoded code  
21 words by the receiving device; and  
22 requesting a retransmission of data when a match cannot be found in the  
23 table for the encoded code words.

1 **14.** The computer program recited in claim 13, wherein the predetermined  
2 selection criteria is that each encoded code word will have any equal number of ones  
3 and zeros.

1 **15.** The computer program recited in claim 14, wherein the minimum  
2 hamming distance between the encoded code words prevents each of the encoded  
3 code words from having fewer than a predetermined number of bits different from  
4 any other encoded code words.

1           **16.**   The computer program recited in claim 15, wherein the accepting of  
2   the data when a match is found in the table containing all the encoded code word,  
3   further comprises:

4           receiving a character by the receiving device;

5           decoding the received character to reduce the number of bits contained in the  
6   receive character;

7           de-scrambling the character by XORing the character with the value received  
8   from the scrambler generator;

9           determining if a first character received is a valid opcode by comparing the  
10   first to a table containing opcodes;

11          transmitting a retransmission request when the first character is not a valid  
12   opcode and

13          repeating receiving a character by the receiving device, decoding the received  
14   character to reduce the number of bits contained in the receive character, de-  
15   scrambling the character by XORing the character with the value received from the  
16   scrambler generator until no further characters are received when the first character  
17   is a valid opcode.

1           **17.**   The computer program recited in claim 16, wherein the predetermined  
2   selection criteria is that each encoded code word will have any equal number of ones  
3   and zeros.

1           **18.** The computer program recited in claim 17, wherein the hamming  
2 distance between the plurality of encoded code words from having fewer than a  
3 predetermined number of bits different.

1           **19.** The computer program recited in claim 18, wherein the minimum  
2 hamming distance is four bits.

1           **20.** A device for transmitting and receiving a packet of information,  
2 comprising:

3           a transmission unit, comprising:

4                   a scrambler generator reset to a seed value upon the first byte of data  
5 transmitted;

6                   an XOR unit connected to the scrambler generator to XOR data  
7 received along with the seed value generated by the scrambler unit; and

8                   a 8b/10b encoder connected to the XOR unit to convert the data from  
9 an eight-bit format;

10          a reception unit, comprising:

11                   a scrambler generator which is reset when the data received;

12                   a 10b/8b decoder to convert the data from a 10 bits format to an 8 bit  
13 format;

14                   an XOR unit connected to the 10b/8b decoder to exclusive or the data  
15 received with a value from the scrambler generator to create an opcode; and

16                   an opcode verification unit to check the validity of the opcode.



- 1           **21.**   The device recited in claim 20, wherein the first byte of data is an  
2   operation code of a plurality of operation codes which are encoded to have equal  
3   number of bits set to zero and one and to have a maximum hamming distance  
4   between the plurality of operation codes, wherein the minimum hamming distance  
5   is no two operation codes have fewer than four bits different.